Abstract of the Invention

A microwave water heating system includes a metal casing having an outer wall defining an interior casing chamber. An inner housing is positioned within the casing and includes an outer wall displaced from the casing outer wall to form an insulating vacuum space. The inner housing includes an inlet port connected to an upstream water source and an outlet port connected to a downstream conduit. The casing and inner housing include generally spherical configurations. The inner housing is configured to induce a vortex of a water stream flowing between inlet and outlet ports. At least one magnetron is mounted to the casing for transmitting microwaves into the inner housing for heating the water stream at the vortex. A float valve in the inner housing allows the water stream to flow and be heated upon demand as the valve operates according to upstream and downstream pressure differentials.